



CSIR NEWS

A FORTNIGHTLY HOUSE BULLETIN OF CSIR

VOL. 27

15 APRIL 1977

NO. 7

Building Research and its Application in Developing Countries : Seminar

An international seminar on Building Research and its Application in Developing Countries, sponsored jointly by the Central Building Research Institute, Roorkee; the National Buildings Organisation, New Delhi; the Housing and Urban Development Corporation, New Delhi; the Structural Engineering Research Centre, Madras; and the Building Research Establishment, UK, was held at Vigyan Bhavan, New Delhi, from 28 February to 5 March 1977. The seminar was organized under the auspices of the International Council for Building Research Studies and Documentation. The main objective of the seminar was to highlight several innovations evolved by developing and advanced countries as a result of research on building materials and technologies, and to find ways and means to promote their application in developing countries for effective utilization of resources and reducing the cost of construction.

Inaugurating the seminar, the Acting President of India, Shri B. D. Jatti, pointed out that there was an unprecedented migration from rural to urban areas. He laid stress on the necessity of bringing about substantial improvements in rural housing including the provision of services like roads, water supply, drainage and electricity.

Thirty-four technical papers were discussed in eight sessions. These sessions broadly covered important aspects of buildings such as the use of indigenous materials and utilization of industrial and agricultural wastes;

simple techniques to increase productivity; social aspects of housing; planning, design and building processes; standard and housing needs; and roofs and coatings. The research needs in developing countries and collaboration in building research were also discussed. All these aspects were presented through various invited papers and were subsequently discussed. The seminar recommended that developed/developing countries should identify subjects for research. It also recommended that the International Council for Building Research Studies and Documentation should constitute commissions on the utilization of agricultural, industrial, mining and mineral wastes as building materials and set up a regional research centre in one of the developing countries. The seminar emphasized the need for further studies on the use of locally available materials such as mud, thatch, bamboo and timber, and particularly on the durability and proofing against climatic hazards. Surveys on the availability of mineral resources for the manufacture of building materials and institutional arrangements for information about development and demonstration of the techniques were also recommended.

In his valedictory address, Shri N. J. Kamath, Secretary, Ministry of Works and Housing, stressed on optimum utilization of scarce resources and development of appropriate technology to suit local conditions.

The seminar was attended by 17 foreign and 77 Indian delegates.

Seminar on Signal Conditioners & Data Loggers: NAL

A three-day seminar on signal conditioners and data loggers was organized by the National Aeronautical Laboratory (NAL), Bangalore, on 10-12 February 1977. This was in recognition of the need for scientific measurement and recording of the multiple variable associated with complex processes in power generation, and metallurgical, petrochemical, fertilizer, cement, mining and ore handling and other industries which are dominant industrial activities of India.

The objective of the seminar was to consider in depth the signal conditioning and data handling needs of the various user industries as well as R&D organizations and to review the state of the art in research, development and production establishments and their capability to meet the needs of the industries.

Inaugurating the seminar, Shri M. Veerappa Moily, Minister of State for Small Scale Industries, Government of Karnataka, stressed the need for promoting indigenous technology in the field of instrumentation and data processing. Dr V. K. Ravindran, Managing Director, Processor Systems (India) Pvt. Ltd, who delivered the key note address, set the tone for deliberations and exemplified the use of microprocessors in many applications such as for electronic exchanges and data logging systems.

Seven technical sessions were held in this seminar. The sessions covered signal conditions, automatic data acquisition systems, microprocessor based data loggers, and industrial

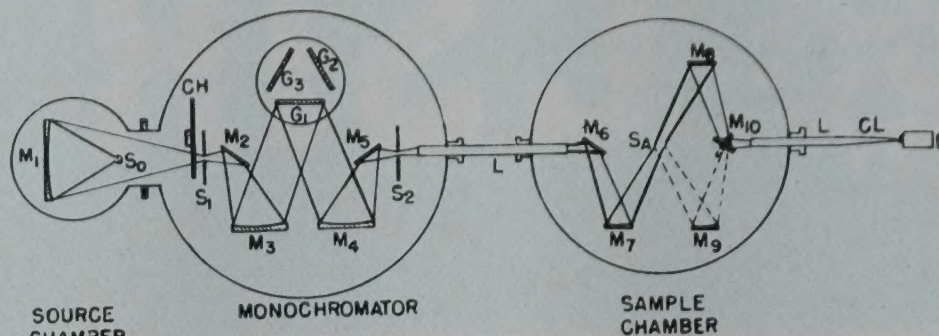
and aerospace applications. A special invited lecture was delivered by Dr U. R. Rao, Director, Indian Scientific Satellite Project, Bangalore, on the data logging applications in satellite launching and controls.

Thirty-seven technical papers were presented in the various fields by scientists and engineers of various organizations such as HAL, GTRE, LRDE, NAL, BHEL and ECIL. In addition to the authors, the participants totalling more than 100 included representatives and field engineers from many other private and public sector undertakings.

The seminar concluded with an 'open session' with Shri C. S. Rangan of NAL as moderator.

NPL's Far-Infrared Spectrophotometer

A far-infrared grating spectrophotometer for the spectral region $15\text{--}300\ \mu$ ($600\text{--}30\ \text{cm}^{-1}$) has been fabricated by the National Physical Laboratory (NPL), New Delhi. Presently, such spectrophotometers covering only a limited spectral region are imported, and unfavourable climatic conditions of higher relative humidity throughout the year in the country restrict their use only to a month or so. The uniqueness of the instrument developed at NPL is that it operates in all the climatic conditions, and being custom-



Working principle of the far-infrared grating spectrophotometer

built it needs no dependence on an outside agency for maintenance.

The optical schematic of the spectrophotometer is shown above. Light from a 220 V, 250 W high-pressure quartz tube mercury lamp source (S_0) is modulated by a fibre chopper (CH) and concentrated by a spherical mirror M_1 on the entrance slit S_1 . The Czerney-Turner system of the monochromator, utilizing $f/2$ optics, consists of flat mirrors M_2 , M_5 in conjunction with spherical mirrors M_3 , M_4 and a grating G . The desired spectral region can be scanned with scanning speeds of $0.75^\circ/\text{min.}$, $0.375^\circ/\text{min.}$, and $0.25^\circ/\text{min.}$ depending upon the spectral resolution.

Leaving the exit slit S_2 , the radiation passes through a light pipe L and a sample area consisting of spherical and flat mirrors and is then concentrated on to the window of a Golay detector (D) by means of a conical light pipe (CL). The modulated signal from the

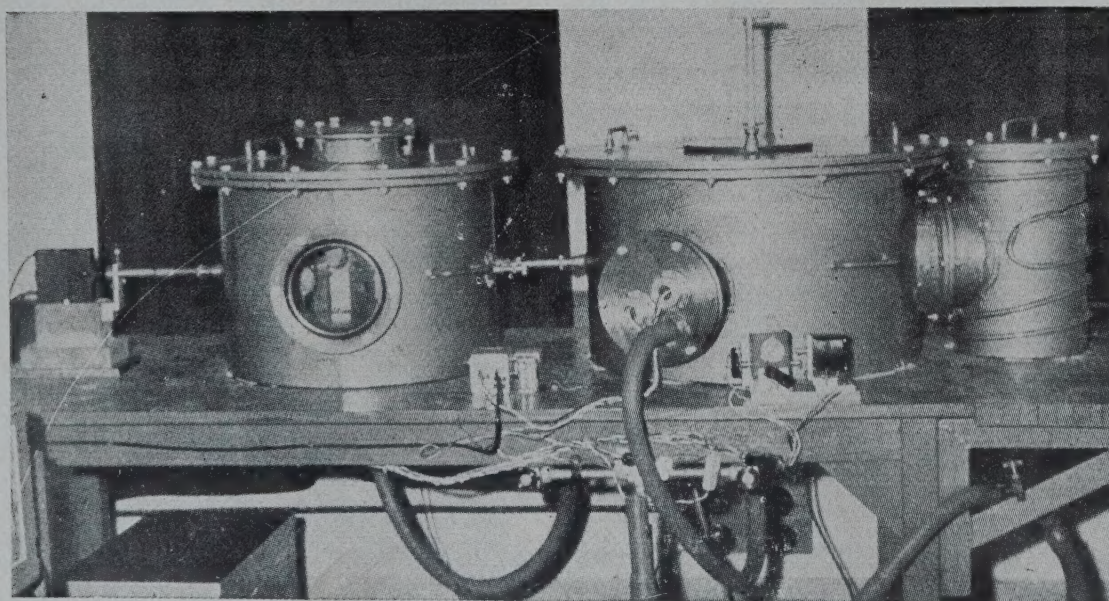
detector is amplified and synchronously rectified by a lock-in amplifier and is then fed to a strip chart recorder.

Four gratings, each of ruled area $10 \times 10\ \text{cm}^2$ and a blaze angle of 26° , are employed for the entire spectral range. Three gratings are mounted on a table such that a grating change can be easily done. Black polyethylene sheets of various thickness are used as a long wavelength pass filter. Crystal powder transmission filters, well known in far-infrared spectroscopy as Yamada and/or Yoshinaga filters, are used to eliminate higher orders.

The source area, monochromator and filter, and sample areas are enclosed in separate vacuum chambers. The source and monochromator are sealed off from the filter and sample area. These chambers are evacuated to a pressure of $50\text{--}100\ \mu\text{ Hg}$.

The spectrophotometer is capable of reflection measurements also. For carrying out these measurements the sample is placed at S_A and the reflected radiation is concentrated to the detector window with the help of the spherical mirror M_9 and a flat mirror M_{10} (rotated properly from the position set for transmission measurement) in conjunction with the conical light pipe. The optical lay-out for reflection measurement is shown by dashed lines.

The spectrophotometer has also provision for the far-infrared studies on solids and films maintained at various temperatures. For these measurements, a stainless steel dewar fitted with reference and sample cells with identical windows is placed at S_A . The reference and sample cells can be



Far-infrared grating spectrophotometer fabricated at NPL, New Delhi

alternately brought in the beam from outside the sample chamber which is under vacuum.

The range of the spectrophotometer can be extended easily up to 600μ (15 cm^{-1}) by mounting proper grating and filter.

A far-infrared spectrophotometer has its wide academic and industrial applications in superconductor physics, semiconductor physics and biophysics. The energy gap of a superconductor; the free carrier concentration, mobility, static dielectric constant and electronic states of impurities; information regarding the structure and the impurity type in such samples which are metastable and/or amorphous in character; librational modes, their dependence to the temperature and factor group splittings due to crystal field effect; and information regarding one-magnon and two-magnon processes and their energies in antiferromagnetic material can be deduced from far-infrared spectroscopy.

Since far-infrared frequencies are essential for complete vibrational assignment and are the motions involving the entire molecules rather than local groups, they are of particular interest to molecular dynamics and to the understanding of the force constants.

Leather for Filters in Blood Pressure Apparatus

A new type of leather using a combination of chromium and zirconium tannages for use as filters in blood pressure apparatus has been developed by the Central Leather Research Institute, Madras. The leather has been produced as per the specification suggested, and the performance is reported to be highly satisfactory.

NAL Develops Low-Power Wind Electric Generator

The National Aeronautical Laboratory (NAL), Bangalore, has designed and developed a wind electric generator to serve as a source of electricity alternative to dry cells which are essential in operating isolated electro-

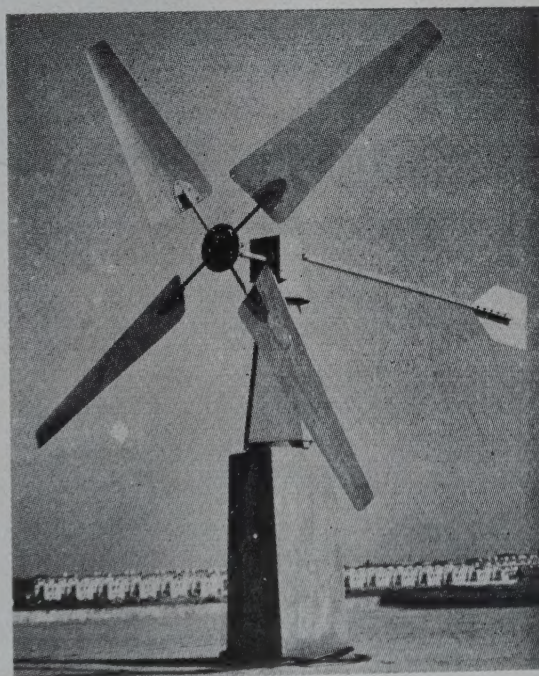
nic system. As and when the wind energy is available the wind electric generator charges a long life battery from which the energy can be drawn.

The wind generator has been designed with emphasis on least maintenance and has the following features: (i) the blades are made of an aluminium alloy and resist corrosion; (ii) the blade assembly has a feathering mechanism to reduce the angle of attack for high wind speeds; (iii) the head assembly is totally enclosed and the steel parts are painted with oven-baked epoxy paint; and (iv) the electric generator is coupled such that slip rings and brushes are avoided.

The device is capable of producing better than 20-30 VAhr of energy on a windy day and is an economically viable alternative to the dry cell. Prototype tests are under way.

The specifications of the wind electric generator are:

Type	: MP 30
Propeller diam.	: 2 m
Number of blades	: 4
Rated speed of propeller	: 150 rpm
Rated wind speed	: 7 m/s
Cut in wind speed	: 3.5 m/s
Rated power of generator	: 30 W
Output of system	: 4 V
Energy storage capability of battery	: 24 VAhr
Output energy on a typical windy day in Bangalore	: 20 VAhr



Low-power wind electric generator developed by NAL, Bangalore

The generator will find application in : aviation lighting on remote features, navigation buoys on seaways, repeater stations for telecom equipment, radio reporting rain gauge stations and similar automatic measuring systems, and power source for radios in isolated windy locations.

Conference Briefs

Dr V. G. Bhide of the National Physical Laboratory (NPL), New Delhi, attended the expert group meeting on solar energy conversion at Vienna from 14 to 18 February 1977. The meeting was convened by the United Nations Industrial Development Organisation (UNIDO) in cooperation with the Austrian Solar and Space Agency (ASSA). Dr Bhide was unanimously elected a vice chairman of the meeting.

The meeting recommended the strengthening of R&D efforts towards solar energy utilization. Dr Bhide stressed that the concept of economic analysis on solar technology and equipment required a different philosophy and approach. As commercial manufacture is still in an infant stage, the analysis of optimum economic scale of production cannot be established at the present moment. There are, however, certain areas such as remote villages in India where no energy source is available and where solar energy offers a viable solution.

Dr Bhide presented the report on solar energy programmes in India and emphasized that with the availability of cheap labour the country could make an impact by undertaking system analysis and feasibility studies on a 10 kWe electrical power plant. Dr Bhide presented two key note addresses, one on conversion of solar energy into mechanical and electrical energy and the other on solar space heating and cooling. Considerable interest was shown by the group in the novel spiral expander designed at NPL and the meeting was keen that NPL should make 10 solar pumps using this expander by the end of the year and try them in villages.

The technology developed at the Central Salt & Marine Chemicals Research Institute, Bhavnagar, for conventional solar still was found to be at par with what was available elsewhere and it was generally felt that the technology was fully developed.

The group felt that the definition of the solar collector efficiency as given by the National Bureau of Standards (USA) was misleading unless the operating temperature and other conditions were specified. Dr Bhide indicated the parameters in relation to which the efficiency of a solar collector should be specified and also brought out that there could be comparative assessment of efficiency in relation to the standard collector. It was suggested that the next international meeting could evolve an accepted test procedure for solar collectors, and definition of efficiency of collectors.

One of the recommendations of the meeting related to the strengthening by UNIDO of the appropriate existing institutions in selected developing countries and transformation of the same into solar energy centres of excellence. India could be the nucleus of such a programme.

SPACE RESEARCH & SATELLITE TECHNOLOGY

Bhatnagar Prize-winner Prof. Rao's Work
Prof. Rao's research interest varies over a wide range of topics such as cosmic rays, interplanetary physics, X-ray and gamma ray astronomy, solar physics and satellite technology. Prof. Rao joined the Physical Research Laboratory (PRL), Ahmedabad, in 1954 for doing research in cosmic rays. After receiving his Ph.D. degree (1960) for studies in cosmic rays, carried out under the late Prof. Vikram Sarabhai, Prof. Rao joined the Massachusetts Institute of Technology (MIT) as a

post-doctoral research fellow in 1961 and worked on cosmic ray modulation and in the investigation of solar wind and its effects on the geomagnetic field. In 1963 he joined the Southwest Center for Advanced Studies (now known as the University of Texas at



Prof. U. R. Rao

Dallas) as Assistant Professor and continued his investigations on cosmic rays. He became the principal investigator for cosmic ray experiments which were successfully flown on Pioneer 6, 7, 8 and 9 deep space probes and Explorer 34 and 41 satellites. The results of his experiments have provided a completely new insight into the interplanetary physics.

Prof. Rao rejoined PRL in 1966, was promoted as Associate Professor in 1967 and as Professor in 1970. At PRL, he continued the investigations in cosmic rays and initiated a new programme of research in X-ray and gamma ray astronomy using balloon-borne, rocket-borne and satellite payloads. The X-ray payload fabricated by his group was also flown on the first Indian satellite Aryabhata.

For his involvement in various spacecrafts, he was requested by Prof. Sarabhai to organize the Satellite Systems Division at the Vikram Sarabhai Space Centre, Trivandrum, in 1970. The rapid development made in this division soon led the Indian Space Research Organisation (ISRO) to venture into satellite technology in a big way. With the establishment of the ISRO Satellite Centre (ISAC) at Peenya, Bangalore, Prof. Rao became its Director in 1972. Under his guidance, the first Indian satellite Aryabhata was designed, fabricated and launched from USSR cosmodrome on 19 April 1975. The team under his leadership is currently designing a 400 kg satellite for earth observations and a 40 kg Rohini satellite, both of which are to be launched during 1978-79.

Prof. Rao was elected a fellow of the Indian Academy of Sciences in 1968. He was secretary of the Indian National Committee for Solar Terrestrial Physics from 1969 to 1972 and its chairman from 1972 to 1975. He is a member of the Indian National Committee for Space Research and member of many other national and international organizations.

For his work on Pioneer 6, 7, 8 and 9 deep space probes and Explorer 34 and 41 satellites, Prof. Rao received the 'Group Achievement Award' by NASA in 1973. For his work on Aryabhata, Prof. Rao was awarded a medal of honour by the USSR Academy of Sciences in 1975. He was the recipient of Karnataka State Award on the Rajyotsava Day in 1975. He was awarded Hari Om Ashram Prerit Vikram Sarabhai Research Award for 1975 for his contributions to space physics. He was awarded Padma Bhushan in 1976. Prof. Rao was also honoured with an honorary doctorate degree in science by the Mysore University in 1976. He has published more than 120 scientific and technical papers.

TRANSFER & RECOMBINATION OF DNA IN BACTERIA

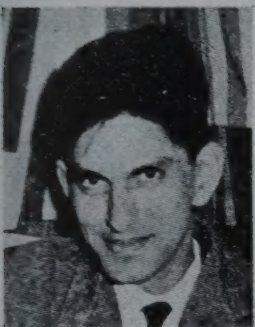
Bhatnagar Prize-winner Dr Siddiqi's Work

Dr Obaid Siddiqi's researches cover a variety of subjects in molecular biology and genetics. His work has been concerned with structure, function and regulation of genes. In 1960 Dr Siddiqi constructed a fine-structure map of the gene *paba* of *Aspergillus*, one of the earliest detailed maps of an eukaryotic gene. This work resulted in the discovery of polarized recombination. In 1962 Dr Siddiqi (in collaboration with A. Garen) discovered the existence of 'nonsense' mutations and their suppression. This discovery led to an under-

Dr Obaid Siddiqi of the Tata Institute of Fundamental Research, Bombay, has been awarded the Shanti Swarup Bhatnagar prize in biological sciences for the year 1975 [jointly with Prof. (Mrs) Archana Sharma] [CSIR News, 27 (1977), 17].

Prof. U. R. Rao, Director, ISRO Satellite Centre, Bangalore, and Professor, Physical Research Laboratory, Ahmedabad, has been awarded the Shanti Swarup Bhatnagar prize in engineering sciences for the year 1975 [CSIR News, 27 (1977), 17].

standing of chain-terminating signals in genetic code and had many useful applications in the study of molecular genetics.



Dr Obaid Siddiqi

Transfer and recombination of DNA in bacteria, the work for which he has been awarded the Bhatnagar prize, has been one of Siddiqi's principal interests. As early as 1961 he had shown that genetic recombination in bacteria

occurs by breakage and rejoining of pre-existing DNA molecules. At the Tata Institute of Fundamental Research, Bombay, he and his associates undertook a study of the mechanisms involved in DNA transfer during bacterial conjugation and in the recombination of DNA molecules in the recipient. By labelling the DNA of the donor bacteria with a combination of radioactive and heavy isotopes in a ingenious manner Siddiqi and his student, P. Vijay Sarathy, could follow the replication and transfer of DNA simultaneously. They showed that transfer of DNA is accompanied by a special cycle of replication. Contrary to the prevalent belief, they found that 'transfer replication' does not provide the necessary driving force for injection and, in certain circumstances, a single strand of pre-existing, unreplicated DNA can be transferred. Siddiqi investigated the fate of the donor DNA and showed that although the bulk of the DNA is broken down, small pieces of single strands are inserted into gaps produced in the double-stranded DNA of the recipient. The subject of DNA transfer and recombination has recently acquired much importance because similar mechanisms are involved in the transfers of plasmids in bacteria. The plasmids are small units of DNA which carry groups of genes that endow bacteria with special capabilities and are of great potential use in genetic engineering. In addition to his

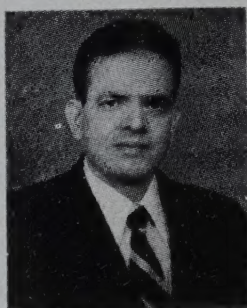
contributions to genetic exchange, Siddiqi has carried out notable work concerning the regulation of gene expression. More recently, he and his colleagues have been engaged in a study of neurogenetics, using mutants of the fruitfly *Drosophila* that carry lesions in their nervous system.

Dr Siddiqi joined the Tata Institute of Fundamental Research in 1962, where he started a molecular biology unit, the first research group of this kind to be set up in India. This group is now a major centre of research in molecular biology in the country. Dr Siddiqi is a fellow of the Indian National Science Academy and of the Indian Academy of Sciences.

STEREOCHEMICALLY CONTROLLED SYNTHESSES OF DITERPENOIDS AND RELATED COMPOUNDS

Bhatnagar Prize-winner Dr Ghatak's Work

Dr U. R. Ghatak has made outstanding contributions to methods for stereochemically controlled organic synthesis, particularly in the fields of diterpenoids and bridged-ring alicyclic compounds related to some physiologically active natural products. His work is marked by a deep understanding of conformational and steric factors of organic molecules which control bond



Dr U. R. Ghatak

formations in organic synthesis and has focussed on new reactions that form such bonds in novel ways.

Known diterpenoids having a complement of twenty carbon atoms in

Dr Usha Ranjan Ghatak, head of the Organic Chemistry Department of the Indian Association for the Cultivation of Science, Calcutta, has been awarded the Shanti Swarup Bhatnagar prize in chemical sciences for the year 1974 (jointly with Dr K. Nagarajan of the CIBA-Geigy Research Centre, Bombay) [*CSIR News*, 27 (1977), 17].

their molecular framework were earlier confined to resin acids. A large number of diterpenoids has been and is being characterized as having a broad range of biological activities including plant hormones, antibiotics, cardiac active compounds, etc. The carbocyclic skeleton patterns of the complex diterpenoids with their pendent groups and unusual stereochemical complexities pose challenging problems in synthesis. Until recently, there had been very few synthetic precedents in this group of natural products, and hence the need for a comprehensive investigation at the initial stage of the work.

In the early stage of the synthetic investigations in diterpenes, Ghatak developed a stereo-controlled total synthesis of *dl*-podocarpic acid, two of its deoxydiastereoisomers and all the four possible diastereoisomeric 20 nor-deoxypodocarpic acid analogues. Some chemical and conformational properties of these compounds were studied in detail. A biogenetically significant tricyclic diterpenoid, semperviol, has also been synthesized stereo-specifically as the corresponding racemic acetate.

The remarkably active phytohormones, gibberellins, discovered in 1938 and whose structures were established in the early sixties, pose a formidable synthetic problem from structural as well as from stereochemical view points. In a comprehensive endeavour during the last decade, Dr Ghatak and his group have developed a few promising 'synthons' towards gibberellins and related compounds. These can be broadly classified into two groups: (i) stereo-controlled syntheses of hydrofluorene and hydrophenanthrene synthons; and (ii) tetracyclic bridged-ring gibbane and a large number of related systems. This investigation is expected to afford closely related structural analogues of gibberellins and their stereoisomers for evaluation of structure-activity relationship of these important phytohormones.

The most significant contribution by this group in the field of diterpene alkaloids is the development of two

new stereospecific synthetic methods of general interest for the key tetracyclic bases, the established synthetic intermediates for garrya and atisine alkaloids.

Stereo-controlled syntheses of several potential intermediates toward the cardiac active *Erythrophleum* alkaloids and some key degradation products of the plant insecticidal diterpene alkaloid, ryanodine, have also been reported.

Important methodologies of general synthetic interest developed in these investigations include the extension of two carbon-carbon bond forming reactions involving intramolecular acid-catalyzed cyclization and copper-catalyzed carbenoid addition in unsaturated α -diazomethyl ketones for stereospecific generation of 6-oxo-bridged bicyclo (3.2.1) octane moiety in polycyclic or simple monocyclic systems. Regiospecific intramolecular oxocarbenoid C-H insertion reaction through a thermal-photochemical copper-catalyzed decomposition of α -diazomethyl ketones has been developed as a stereospecific method of angular alkylation. Another remarkable recent discovery relating to these investigations is the introduction of a new method of stereospecific angular alkylation through a high yield rearrangement of some easily accessible angularly fused polycyclic cyclobutanones to the respective bridged cyclopentanones.

Terpenoids, alkaloids and many other complex natural products contain bridged-ring carbocyclic and heterocyclic systems. In addition, bridged-ring compounds provide important intermediates towards stereospecific introduction of functional groups in cyclic systems as well as rigid models for conformational analysis, reaction mechanism, bond strain, bond-angle distortion proximity effects and spectral studies. Many of these points have been reflected in Ghatak's works relating to the bridged-bicyclo (3.2.1) octane and bicyclo (3.3.1) nonane carbocyclic systems. The synthesis of ($\pm$)-des-N-morphinan, first reported by this group, has been found to be a strong attractant for *Rhinoceros beetle*,

a pest of coconut palm, in olfactometer tests.

Dr Ghatak is extending his research to insect pheromones and bridged heterocyclic compounds.

PROGRESS REPORTS

CMRS Annual Report : 1975-76

The annual report of the Central Mining Research Station (CMRS), Dhanbad, for the year 1975-76, brought out recently, shows that the number of sponsored projects during the year increased by 46% and the earnings by 43% over those of the previous year. The laboratory continued 96 sponsored projects and started 196 new sponsored projects. Three CMRS projects were continued and nine new projects were taken up.

Roof bolting and roof stitching investigations were conducted in a number of mines. At the West Victoria coalmine of BCCL, Laikdih seam was being worked in lifts from bottom upwards. The split galleries were stowed after extraction within a month. The immediate roof exposed during splitting had a weak shale band. This roof used to fall after exposure to moisture. The split galleries were required to be supported systematically. The suitability of bamboo bolts was investigated to support the immediate roof and reduce the density of timbering in the split galleries. The anchorage strength results indicated that solid bamboo pieces of 37 mm diam. and 1.5 m length split for full length could take a minimum load of two tonnes. Bamboo bolts were also experimented for preparation of sand stowing barricades. The advantage of this type of barricade was that it did not require any prop and the cost of barricading was also less.

The bamboo bolting method was found suitable also in the Nageshwar Satgram coalmine, where the results of a contract investigation established that the bamboo bolts were effective in supporting the weak shale roof in

the heightened galleries. The ~~flc~~ coal extraction in the second stage operation did not affect the roof supported with bamboo bolts earlier. On the other hand, in galleries supported with conventional wooden props, the props had to be erected twice, once before and once after heightening. These bolts could be installed fast close to the working face and were not dislodged while blasting.

Experiments on wooden bolting were successfully carried out at the Sudamdih coalmine of BCCL. The experiment confirmed that wooden dwelling was successful in the Jankowice face where maximum recovery of timber could be achieved.

Investigations on roof bolting were also carried out at Sudamdih, Nandira and Moonidih coalmines. Based on the results of anchorage tests and roof sag measurements, roof stitching was recommended as a regular support at the Godavari Khani No. 1 and No. 5 inclines, Mithapur mine, Margherita group of mines, VK 7 incline, and Handidua and Jigni coalmines.

Investigation on strata control was carried out in mines as well as tunnels. Problems related to roof collapse, roof support, subsidence, drilling, blasting, gas, fire, corrosion and dust were investigated. Feasibility of inclined slicing was studied, and safe barrier against waterlogged workings was determined in the laboratory using a mine model. Efficacy of knife-edge method of working, determination of economical size of stooks and feasibility of extraction under surface structures as well as railway lines were investigated. Design of new stowing plants was provided to several mine authorities and plans for reorganization of a number of existing plants were supplied. Feasibility of various materials was studied for use in stowing. Ventilation survey was carried out in mines and plans for efficient ventilation system were provided for a number of mines. Noise survey was conducted in a steel factory, and environmental health hazard in and around a fertilizer factory was assessed. Various explosive composi-

tion were investigated for incendivity characteristics.

Recoverable rope bolt, ultra-safe blasting circuit tester, ammonia detector tube, methane monitoring system, and booster fan control unit were developed. Development of various types of explosives, detector tube for sulphur dioxide and oxides of nitrogen, electrical and mechanical drill, friction prop and communication system for mines and aerial ropeway was in hand. The suitability of some instruments and chemicals was tested prior to their use.

The laboratory determined the physico-mechanical properties of various coal and rock samples. Gas, ore, alloys, oil, dust, etc. were analyzed. Crossing point temperature of coal samples was determined. Testing of wire ropes and other mining components, and flameproof, dust-tight and dustproof testing of various equipment was carried out. Detonators, explosives and miners' safety equipment were tested.

Investigation was conducted to study the behaviour of stowed goaf and roadway supports, influence of goaves and abandoned pillars, geological factors concerning the fall of roof and sides, and influence of different mining parameters and face characteristics on the span at which first weight occurs. Techno-economic studies at stowed longwall faces were carried out. A pilot scheme for degasifying a coal seam was successfully carried out. A survey was conducted to find out the extent of defective vision and other ophthalmic diseases prevalent amongst miners. Dust in the air of a mine was assessed and bacterial oxidation of methane, microbial desulphurization of pyritic coal and bacterial mining of low-grade copper ore were investigated. Attempts were made to correlate formation of dust and strength of coal and to find out the cuttability and drillability index of Indian coal. The laboratory also studied the flammability of coal samples and the effect of humidity on coal dust explosion. Air pollution survey was conducted in Jharia coalfield.

CMRS developed a portable grouting machine for use in roof bolting and roof stitching operations. A simple grouting technique was also evolved. Development of moisture absorbent; chemical for use in breathing bag; linear type carbon monoxide detector tube; methane relay, alarm and continuous recorder; inhibitor to check spontaneous heating; instructional gas cap demonstration apparatus, signalling system for mines; transducer; dust extractor; dust indicator; personal clean air device and blasting material was in progress. Work on a method for testing explosives and detonating fuse and studies on different types of earthing station in mines were being continued.

Six patents were filed during the year. The earnings during the year from sponsored projects, consultancy services, testing, analysis, and sale of products and publications were about Rs 20 lakh as against Rs 14 lakh in the previous year.

PERSONNEL NEWS

Appointments/Promotions

Shri B. K. Mazumdar

Shri B. K. Mazumdar of the Central Fuel Research Institute (CFRI), Dhanbad, has been appointed, on promotion, Scientist F at CFRI with effect from 10 November 1976.

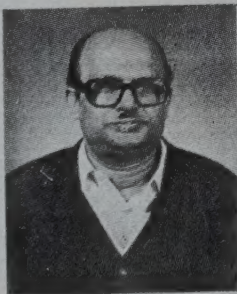
Shri Mazumdar (born 1925) had his education at the University of Calcutta (B. Sc., 1944; and M. Sc., 1946). In 1947, he joined the Indian Institute of Science, Bangalore, as a research assistant in a CSIR research scheme.

Joining CFRI in 1949, Shri Mazumdar worked for the first seven years mainly in its three regional coal survey laboratories at Raniganj, Jharia and Ranchi. Here, besides working on physical and chemical survey of Indian coals, he also developed a new system-

atics of coal, coal evaluation and coal grading, based on proximate analysis alone, with an interpretation of a hitherto unknown role and nature of moisture in coal. This work, also extended to foreign coals, is considered a breakthrough in this field. Continuing researches into more fundamental aspects, in particular coal chemistry, for over two decades, Mazumdar and his colleagues have been mainly responsible in creating an active school of thought on coal science. Such pioneering work and knowledge on coal constitution and coal structure have since led to the development of products and chemicals from coal, especially the coal fertilizer, and have earned him international reputation in the science and technology of coal. More recent researches carried out by Mazumdar and his colleagues relate to the development of chemical methods of demineralization of coal for the production of de-ashed coals, suitable for different types of carbon artefacts and electro-metallurgical industries, as well as studies on spontaneous combustion of coal *vis-a-vis* the industrial problem of stacking and transporting of coal, including shipment of Indian coals for export.

Shri Mazumdar was promoted as Junior Scientific Officer in 1955, Senior Scientific Officer (Grade I) in 1959 and Assistant Director in 1964. In addition to his responsibility as the head of the Division of Coal Constitution and Products & Chemicals from Coal, and coordinator of General Analytical, Mineral Technology and Agricultural sections, he is the chief coordinator of the Coal Survey Organisation.

Shri Mazumdar is recipient of merit increment awarded by CSIR (1962), National Metallurgists' Day award (1969) and silver medal award (1970) by the Coke Oven Managers' Association, UK (Indian Section). He has participated in: (i) Third Round Table Conference on Coal Science, Brussels (sponsored by European Research Associates, 1960), and (ii) American Conference on Coal Science, Pennsylvania (sponsored by the Penn-



sylvania State University jointly with the American Chemical Society, 1964). Shri Mazumdar has to his credit 55 research papers and three patents.

Shri K. Sridhara

Shri K. Sridhara, Scientist, National Aeronautical Laboratory (NAL), Bangalore, has been appointed on promotion Scientist EI at NAL with effect from 25 January 1977. Shri Sridhara (born 25 May 1941) obtained his bachelor's degree in mechanical engineering from the University of Mysore in 1962 and master's degree in internal combustion engineering with distinction from the Indian Institute of Science, Bangalore, in 1964.

Shri Sridhara joined the Propulsion Division of NAL in December 1965. He visited UK during September 1966 to December 1967 under the ICAO Fellowship Programme of UN. In UK he obtained his master's degree in gas turbine technology from the Cranfield Institute of Technology. He also visited the National Gas Turbine Establishment, Farnborough, and Rolls Royce Ltd, East Kilbride, to study engine test facilities.

Shri Sridhara has participated in the setting up of a combustion and gasdynamics laboratory in the Propulsion Division and in various research programmes pertaining to gas turbine components. He has worked on combustors, afterburner ignition systems, supersonic ejectors, nozzles and engine performance. He served as member of the Analysis Group of the AVRO Evaluation Committee.

Shri Sridhara is an associate member of the Aeronautical Society of India and has several publications to his credit.

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The following personnel of the Publications & Information Directorate, New Delhi, have been promoted from Scientist E I to Scientist E II : Shri K. Kashyapa (17 Dec. 1975) and Shri R. N. Sharma (17 Dec. 1975).

Dr M. Gopal Rao has been appointed Scientist B at the Central Leather Research Institute (CLRI), Madras (25 Feb. 1977).

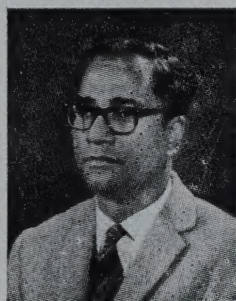
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The following personnel of CLRI have been promoted : Dr S. M. Bose (from Scientist EI to Scientist EII; 17 Dec. 1975); Shri M. A. Ghani (from Scientist EI to Scientist EII; 17 Dec. 1975); and Shri K. R. V. Thampuran (from Scientist A to Scientist B; 25 Feb. 1977).

Honours

Prof. Dinesh Mohan

Prof. Dinesh Mohan, Director, Central Building Research Institute, Roorkee, has been elected vice president of the International Society of Soil Mechanics and Foundation Engineering for the Asian Region for a four-year term commencing 1977. This is a rare honour bestowed on an Indian scientist, Dr K. L. Rao being



the only other recipient. The title will be formally conferred on him at the ninth international conference of the society to be held in Tokyo in July this year. Prof. Dinesh Mohan is an international authority in soil mechanics, foundation engineering and building sciences.

PATENTS FILED

70/Del/76 : Magnetic particle clutch, S. K. Basu & H. Bagchi—CMERI, Durgapur.

71/Del/76 : Dezincing of steel scrap by leaching with inhibitor-impregnated acid, P. B. Mathur & N. Venkatakrishnan—CECRI, Karaikudi.

75/Del/76 : A process for producing precast ferro-cement cylindrical units for use in structures like grain storage bins, water tanks, biogas holders and pipes, G. V. S. Kumar, P. C. Sharma

& S. Gopalakrishnan — CLRI, Roorkee.

76/Del/76 : A chemical process for improvements in or relating to the process of reduction of mineral matter in graphite, R. L. Seth, D. M. Bhat, N. P. Singh & P. N. Mukherjee—CFRI, Dhanbad.

12/Del/77 : A process of working up high-grade refractory magnesite from low-grade magnesite, B D. Chattaraj—RRL, Jorhat.

National Convention on Applied Numerical Analysis

The Computer Society of India (Bangalore Chapter) has proposed to hold the first ever convention on Applied Numerical Analysis at Bangalore on 23 and 24 June 1977. Planned jointly with the National Aeronautical Laboratory and the Indian Institute of Science, the convention aims at bringing together all those interested in strengthening the numerical analysis base of the country.

There will be four sessions for presentation of papers in numerical linear algebra, numerical solution of differential equations, numerical approximations, and numerical solution of non-linear systems.

Abstracts of papers intended for presentation at the convention should be sent to the Programme Coordinator by 15 May 1977. Complete papers should be submitted in the form of cut stencils (quarto size), not exceeding 10 sheets, by 31 May 1977. The registration fee for members of the Computer Society of India is Rs 15 and that for non-members is Rs 25.

The detailed programme of the convention will be sent to the participants in due course. Further information can be had from : Shri S. Janardhan, Programme Coordinator, National Convention on Applied Numerical Analysis, C/o National Aeronautical Laboratory, Post Bag 1779, Bangalore 560017.